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ABSTRACT

A demonstration project was undertaken to determine whether 1978 telefacsimile technology--specifically the Qwip 1200, the Rapidfax 100, and the Colorado Video Inc. Slow Scan Television--could address rural public library needs in an effective manner. Five public libraries in developing communities in Colorado, Kansas, Montana, South Dakota, and Wyoming were selected as demonstration sites; the TALINET design utilized the local staff and a research/resource information staff at the University of Denver to research site questions and deliver information to the sites via telefax. A total of 958 reference questions were answered during the study; only 28% of the questions were time-critical, i.e., the answers would have been less useful to end-users if telefax had not been available. However, telefacsimile was found to be almost the least costly information delivery methodology. In the executive project report, the TALINET system and network are briefly described, as are study procedures and findings. Photographs of TALINET personnel, equipment, and demonstration sites are provided. (ESR)

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TELEFAX LIBRARY INFORMATION NETWORK

Graduate School of
Librarianship and
Information Management
University of Denver
1979

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EXECUTIVE REPORT

HEW Grant 032A-7804-P4041
Office Of Telecommunications Policy
Office Of The Assistant Secretary
For
Planning And Evaluation

JULY 1979

Telefax Library
Information Network

The research report herein was performed pursuant to a grant from the U.S. Department of Health, Education and Welfare, Washington, D.C. The opinions and conclusions expressed herein are solely those of the author, and should not be construed as representing the opinions or policy of any agency of the U.S. Government.

Ben M. Cherrington Building, University of Denver Graduate School of Librarianship and Information Management

INTRODUCTION

In our highly technological society, the volume of scientific, business and other information has been growing at a rate greater than our ability to disseminate it properly. As energy, industrial, research and engineering developments expand in various parts of the country, the ability to deliver accurate and timely information will become more and more crucial to persons involved in these projects. The problem will be (and already is) of especially vital importance to persons living in remote areas far from major reference libraries.

Today, such informational needs may take days or weeks to supply and the information may be too dated when it arrives to be of much use. More rapid methods of delivery for time-sensitive material are often too expensive.

The TALINET project was designed to demonstrate the use of telefacsimile to speed the delivery of specialized information to local libraries from a centralized resource library and other information sources, to determine the need and economic feasibility of such a system, and to gauge public response through marketing efforts.

The telefacsimile equipment on which the TALINET project was based has been available in various degrees of sophistication since the 1920's. Numerous experiments have been performed to define its use and cost-effectiveness in many applications, including libraries.

While past demonstrations have not been convincing to librarians, recent technological developments, resulting in greater legibility of facsimile material, decreased transmission time and simplified operation of equipment, have once again made telefacsimile an interesting possibility for increasing library resources.

As more traditional delivery systems (U.S. Mail, private courier, telex, et. al.) become more and more expensive, telefacsimile is becoming a very competitive alternative.

Despite the inherent limitations of narrow band (telephone) technology, affecting both cost and the rate of information transfer, telefacsimile proved cost-competitive with other systems, and considerably faster, in most TALINET situations.

Satellite and other communications technologies will improve as they become more commonplace in coming years, and telefacsimile capabilities, as evidenced in the TALINET study, will undoubtedly grow more important to libraries and other agencies.

TALINET, and other projects like it, are essential if we are to make our ever-expanding information resources equally accessible to all of our citizens.

Margaret Knox Goggin

Margaret Knox Goggin
Principal Investigator

William E. Rapp

William E. Rapp
Project Director

Graduate School of Librarianship
and Information Management
University of Denver, 1979

Margaret Knox Goggin

William E. Rapp

THE OVERVIEW

The electronic transmission of data — in many forms — is becoming more and more a part of our lives. From Pioneer 11 beaming photographs of Saturn from a billion miles away in space to an intercom call into the next office, electronic communication saves time and brings us information that might otherwise be unavailable.

The TALINET system described in this report was an experiment to explore the feasibility of using telecommunications to achieve a rapid and accurate exchange of information between a central resource library and smaller outlying libraries without extensive information resources.

A result of one of eight telecommunications grants from HEW, the TALINET project was designed and directed by the Graduate School of Librarianship and Information Management of the University of Denver. It was the only project with a library orientation.

The telefacsimile equipment on which the project was based traces its origin back to experiments in the 1920's.

The need for speed in transmitting such items as news photos, weather charts, police records and other time-critical materials prompted much of the early telefacsimile development. Further development during World War II aided in the timely dispatch of military documents and orders.

While the early telefacsimile systems usually required specialized communication networks and facilities, the need for telefacsimile equipment for the business sector in the early 1960's prompted the development of compact equipment which utilized public telephone lines for transmission of purchase orders, bills and other documents. These much less expensive business telefacsimile systems prompted more widespread use and development.

The use of facsimile equipment in Library applications was demonstrated at the Library of Congress in 1948, and by 1953 Scott Adams had outlined a comprehensive plan for the use of facsimile and other technologies in supplementing the resources of local libraries.

Several experiments were carried out in the '60's to determine the impact of telefacsimile interlibrary loan of urgently needed materials.

The library experiments were generally failures due to high cost, unreliable equipment, poor or unusable quality of the transmitted product, or an unproven need for the service.

In some cases, requested materials were not picked up for hours or even days after prompt telefacsimile delivery, despite the fact that the requestor stated an urgent need. In many cases more traditional modes of transmission would have been adequate.

But the tremendous advances in electronic communications in recent years, our increasing need of specialized knowledge, and the development of information resource networks prompted new experimentation.

The TALINET project was designed to assist library patrons in need of specific information beyond the resources of their local library.

Prior to TALINET, the required information could be obtained by the local library in various ways:

- by interlibrary loan
- by photocopied material sent through the mail
- by travel to the resource library
- by Telex or other keyboard-based electronic message systems
- by telephone voice communication

The main problems with these five methods, aside from inherent limitations of the resource library, are time and expense. Interlibrary loan and photocopied materials are of relatively low cost, but it could take days or weeks for the information to reach the requestor. Travel to a distant resource library could be done in a single day or less in some cases, but at high cost. The use of keyboard-based message systems can be useful, but only when the volume of transmitted information is small. A call to a distant resource library can be a quick way to obtain a limited amount of information, but is impractical when more than a small amount is needed.

With the TALINET system, however, the information can be accessible in some cases within minutes, the time factor being determined primarily by research time needed by the resource library staff.

Cost effectiveness of the TALINET system is dependent on the volume of requests. When the equipment is little-used, the installation, rental and supervisory costs cannot be justified on the basis of economics alone, but when the volume of requests reaches a "breakeven" point, the telefacsimile system becomes cost competitive with other methods.

THE SYSTEM

The TALINET project tested three separate telecommunications equipment systems:

- Qwip 1200
- Rapifax 100
- Colorado Video, Inc. Slow Scan Television

The Federal Library Network Prototype Project (FLNPP), with which TALINET became associated, established parameters and selected these three equipment systems for testing. The choice of equipment for TALINET was made to make it compatible with FLNPP. Each of the fifteen FLNPP sites and five TALINET sites, along with TALINET offices at the University of Denver, were equipped with each system.

Each of the three systems had its own strengths and weaknesses as they were used in TALINET.

Of the three, the Qwip 1200 system proved the simplest and easiest to operate. The primary difficulties encountered were with the strong odor emitted and the malfunctioning of the paper clamp. Some problems also arose from the fact that both a sender and a receiver were necessary to operate the system, thus requiring a library staff member at both the receiving and sending ends.

The Rapifax 100, a more complicated and expensive system, has the capability of receiving facsimile materials without an attendant present, requiring only the sender to be present at one end. Only minor problems, such as drying out or jamming of paper, were encountered with this system.

The C.V.I. Slow Scan Television system was much more sophisticated than the other systems. It provided a visual image on a television tube, but had no hard copy capability.

It was envisioned that this system would allow the previewing of materials to determine what should be sent in hard copy, a facsimile or the document itself. The C.V.I. equipment was therefore used as a screening device.

More complete descriptions of these systems will be found on the following pages.

Jim Boyce, Talinet assistant director, using C.V.I. slow scan equipment

QWIP 1200

The Qwip 1200 is a compact desk-top telefacsimile system designed for low volume applications where low cost is essential.

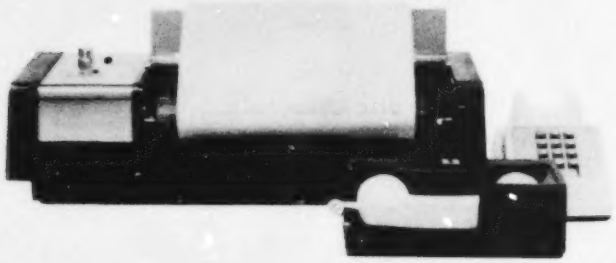
With a four minute transmission time, the Qwip 1200 will send an 8½ by 11 inch sheet with a resolution of 64 by 96 lines per inch, adequate for many applications. A six-minute transmission time yields more resolution, 96 by 96 lines per inch.

Material to be transmitted must be hand mounted to a rotating cylinder. As the cylinder rotates, the material is scanned by a fiber optics system. The scanner's output consists of a continuously modulated (FM) analog signal which is transmitted along conventional telephone lines. At the receiving end, the signal is transferred to special copy paper on the rotating drum by an electrosensitive process.

The 1200 series is compatible with many other FM analog telefacsimile machines.

Leased or rented units are covered by a "repair by replacement" policy whereby defective units are replaced in whole, rather than repaired in the field.

The Qwip 1200 is marketed by:
Quip System
1270 Avenue of the Americas
New York, New York 10020



RAPIFAX 100

The Rapifax 100 is a free standing console model facsimile transceiver offering more speed and resolution than drum type facsimile units.

With a transmitted document as large as 8½ by 14 inches, the Rapifax 100 can achieve a resolution of 200 by 200 lines per inch of copy with a 90 second transmission time. Transmission times as short as 35 seconds can be achieved with a loss of resolution.

As a facsimile transmitter, the Rapifax 100 operates by the flat-bed method. Subject copy lies flat as the scanner analyzes light reflected from tiny portions of its surface. White paper reflects more light than printed copy and the output signal varies accordingly. The digital output signal is converted to a frequency modulated analog signal for transmission along standard telephone lines.

In the receiving mode, the Rapifax 100 employs the electrofax process with a liquid toner. The specially coated copy paper is automatically cut from a 460 foot roll. Unattended reception capablity reduces the staff time required.

Although the Rapifax is not compatible to other digital facsimile units, a special option makes it compatible with many FM analog transceivers.

The Rapifax 100 is marketed by:
Rapicom, Inc.
6 Kingsbridge Road
Fairfield, New Jersey 07006

C.V.I. SLOW SCAN TELEVISION

The Colorado Video, Inc. Slow Scan Television system consists of a video camera and compressor to scan the copy and allow transmission over voice grade telephone circuits, along with a video expander and television monitor to reproduce the image at the receiving end.

Resolution of the television monitor is set at 525 lines, the U.S. standard. The camera may be focused on the entire page of copy or, to increase readability, may be set for close-ups of individual portions of the copy.

This equipment does not provide hard copy to be examined later, and consequently the requesting patron must be present at the time of transmission to obtain the required information. In all, three persons were required for each TALINET transaction: the sender, the receiver and the patron.

The equipment is compatible with video recording systems which would provide a permanent record, and with conventional photography which could be used to record the copy from the television screen, though neither of these methods were used in the TALINET project.

This equipment is marketed by:
Colorado Video, Inc.
3245 Prairie Avenue
Boulder, Colorado 80302

THE TALINET NETWORK

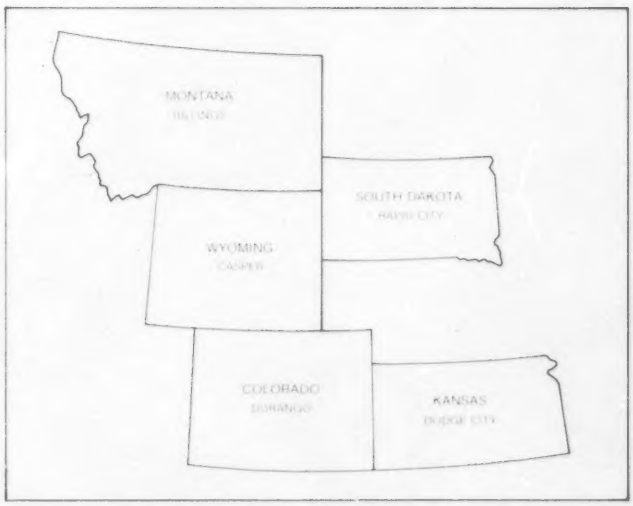
The network was designed to use the same equipment being utilized by the fifteen federal and non-federal libraries of the Federal Library Network Proto. ype Project (FLNPP). The FLNPP libraries were employed as a resource base for the TALINET project with the National Oceanic and Atmospheric Administration (NOAA) library in Boulder, Colorado serving as the central processing location for TALINET project requests.

The five TALINET demonstration libraries were selected from five western states to represent small-to-medium libraries in areas of considerable growth and/or impact from energy or related developments. They were picked to demonstrate, as well as possible, how any similar library could utilize telefacsimile equipment in their current reference information system.

The FLNPP libraries involved were:

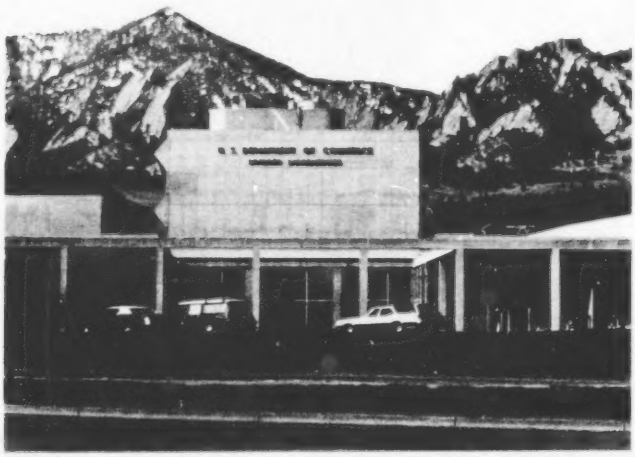
FEDERAL
Argonne National Laboratory Library, Argonne, IL
Lawrence Berkeley Laboratory, Berkeley, CA
NOAA Library, Boulder, CO
NOAA Library, Miami, FL
NOAA Library, Rockville, MD
EPA Library, Cincinnati, OH
EPA Library, Triangle Park, NC
Coastal Engineering Research Center Library,
Ft. Belvois, VA
Brookhaven National Laboratory, Upton, NY
Engineers Waterways Experiment Station, Vicksburg, MS
Corps of Engineers, Washington, D.C.
National Bureau of Standards, Washington, D.C.

NON-FEDERAL
Main State Library, Augusta, ME
University of Maine, Orono, ME
Portland, Maine Public Library



State locations of the five TALINET demonstration libraries.

Joan Maier, Director
NOAA Library and FLNPP


NOAA, Boulder, Colorado

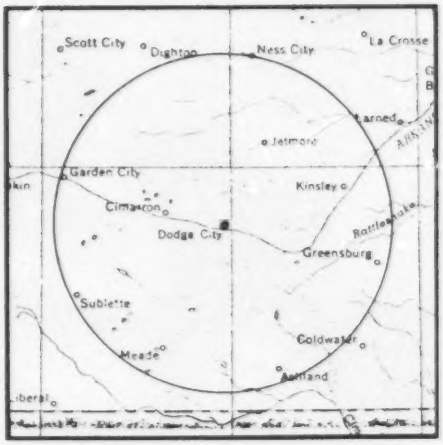
DODGE CITY PUBLIC LIBRARY

The Dodge City Public Library serves an area with an estimated population of 24,000 in 1978, compared to 22,587 in 1970. Farming and cattle industry, along with related services, are the major employers in the area. Dodge City acts as a supplier of consumer and industrial goods, as well as a cultural and educational center to the surrounding area.

Staff of the Public Library consists of five professionally trained librarians, four clerical employees and several volunteers. The total number of in-house holdings in 1977 was 51,699 adult volumes, 38,707 juvenile volumes and 15,382 volumes classified as "other."

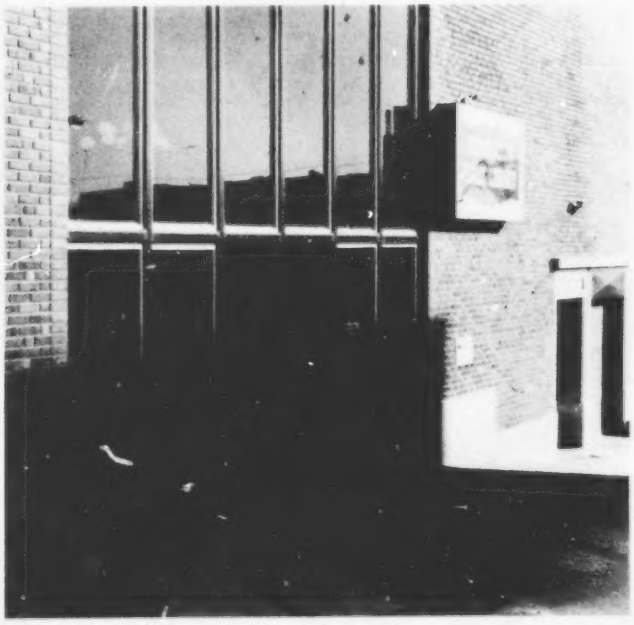
The Dodge City Public Library also has access to resources of the Cultural Heritage and Arts Center, The Dodge City Community College Library, The Saint Mary of the Plains College Library as well as the South West Kansas Library System.

Pete Daniels was the Graduate Research Assistant assigned to this site from the University of Denver's Graduate School of Librarianship and Information Management.



Source: USGS

Pete Daniels, Graduate Research Assistant



Dodge City Public Library, Dodge City, Kansas

DURANGO PUBLIC LIBRARY

In an area rich in natural gas, oil, coal, uranium and geothermal energy resources, this southwest Colorado town serves an area with total population of 23,900 in 1978. The population in the area has risen 24.5 percent since 1970. Development of the energy industries in Durango is still in early stages, but a large tourist and ski industry, coupled with education, agriculture, lumbering and retail trade make up the majority of the area's economy.

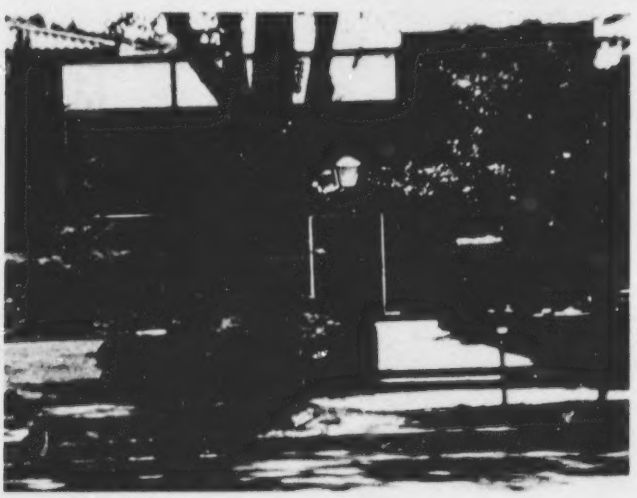
Durango serves as the recreational, industrial and retail sales center, as well as the cultural and educational hub for the surrounding area.

The public library employs 13 staff members, two of whom are professionally trained (the director and cataloger). In July, 1978, the director of the library resigned and consequently this site began the TALINET project in the midst of many internal changes.

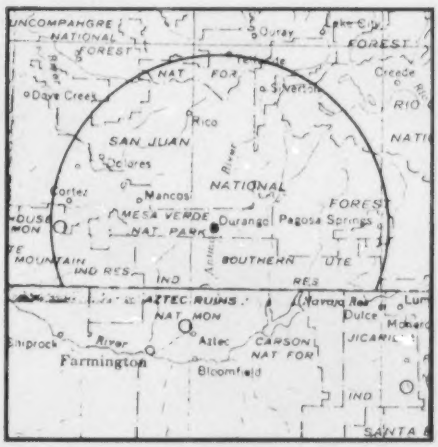
The library circulated a total of 176,125 volumes in 1976 and operates without a formal system of handling reference requests. Reference requests were difficult to gauge.

Other reference resources are available through the Southwest Regional Library Service System, the Fort Lewis College Library and the Colorado State University (for agricultural materials).

University of Denver GRA Eric Halverson was assigned to coordinate the TALINET project at Durango.



Durango Public Library, Durango, Colorado



Source: USGS

Eric Halverson, Graduate Research Assistant

NATRONA COUNTY PUBLIC LIBRARY

Casper, Wyoming, is the county seat of Natrona County and is located in the geographic center of the state. The 1975 population for Casper was 45,669, having grown from 39,361 in 1970. Projected 1979 combined population of city and county is 71,000.

Petroleum exploration, development and refining is Casper's largest single industry, followed by natural gas production and uranium mining. With large coal deposits located in the vicinity, coal mining will likely become a big industry in future years.

The Natrona County Library consists of a main facility in Casper, a branch 40 miles to the north in Edgertown, and a roving bookmobile. The service-oriented staff totals 25 full-time employees, of whom six and one-half have professional training.

With total in-house holdings listed at 178,765, the library reference department employs three professional librarians and maintains a broad selection of reference materials. It is the nation's only library holding Department of Energy Uranium Exploration Reports. A large Earth Sciences Collection contains materials of particular interest to the mineral industry. 1978 reference requests averaged 3,400 per month.

The Natrona County Library cooperated with neighboring libraries, informal reference networks and the Wyoming State Network in obtaining reference resources, but it is not a formal member of any library system.

In addition to normal library systems, the Natrona County Pulic Library also operates a public television station.

GRA Cindy Kraybill was assigned to coordinate efforts between the library and the TALINET project.

Natrona County Public Library, Casper, Wyoming

Cindy Kraybill, Graduate Research Assistant

Source: USGS

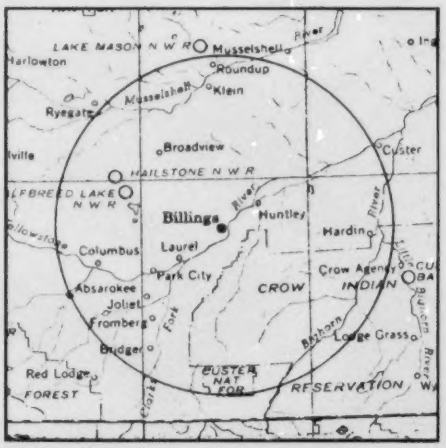
THE PARMLY BILLINGS PUBLIC LIBRARY

Billings, a city of 80,000 population in 1978, is the largest city in a 500-mile radius and serves as the distribution, retail, medical, cultural and entertainment center for over a quarter of a million people in Montana and surrounding states. Food and petroleum processing are major industrial activities, followed by the manufacture of wood, wool, metal, glass, concrete and clay products. The 1970 population at Billings was 61,581.

Heavily used by business, government and civic organizations, the public library is also a community meeting cente

The service-oriented staff of twenty seven and one-half full-time employees boasts of 10 with professional library degrees. The total number of in-house titles as of June 1975 was 142,952 with a total of 242,801 volumes. In addition to its own internal reference resources, the Parmly Billings Library has access to other state libraries through the Montana Information Network and Exchange (MINE) and out-of-state library access through the Pacific Northwest Bibliographic Center in Seattle.

Joyce Sethre was the University of Denver Graduate Research Assistant (GRA) assigned to help coordinate the project at Billings.



Source: USGS

Joyce Sethre, Graduate Research Assistant

Parmly Billings Public Library, Billings, Montana

RAPID CITY PUBLIC LIBRARY

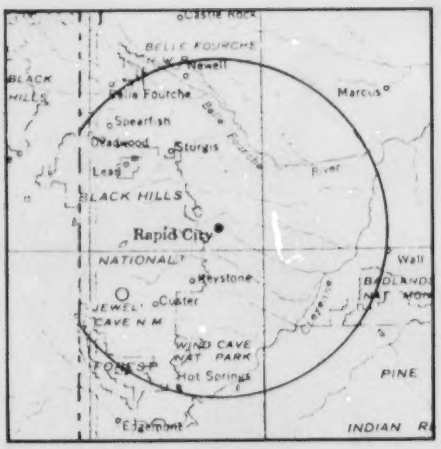
With an estimated 1977 population of 51,500, Rapid City is listed as the third fastest growing area in the United States in Sales and Marketing Management (S&MM) compilations. the 1970 census listed 43,836. Agriculture and tourism are major employers, followed by the federal government, retail trade, services, manufacturing and construction.

This service-oriented library employs 16 full-time staff members and 10 part-time members. Six of the staff hold Masters library degrees, another three hold B.A., B.S. or equivalent degrees. The library operates a bookmobile.

Along with holdings of 92,991 books, the library also maintains collections of 8mm films, government documents, magazines and journals, art and recordings. 1978 circulation total of all items borrowed from the library was 245,231 with 25,698 borrowers. Reference requests in 1978 reached 10,915.

In addition to internal reference collections the Rapid City Public Library also utilizes resources of the South Dakota School of Mines and special local libraries, including those of private individuals. The Bibliographic Center for Research in Denver and the South Dakota State Library are also used for reference resources.

University of Denver GRA Maureen Crocker was assigned to this site by TALINET.



Source: USGS

Maureen Crocker, Graduate Research Assistant

Rapid City Public Library, Rapid City, South Dakota

THE PROCESS

The TALINET process began with community analysis to determine the demographics of each of the selected project sites. The make-up of the town, its residents and their informational needs and library use were prime concerns in the development of the TALINET project.

The second phase of the process was marketing of the TALINET Program. Various marketing tools were employed to inform the public of the program and how they could benefit by it. News releases, printed flyers, public contact and direct mail were among the methods used by the site libraries. In view of the fact that 70 percent of all TALINET users became aware of the project through one or more of the marketing efforts, this phase was highly effective.

The third phase of the process entailed the actual handling of TALINET information requests.

Library personnel (usually the site coordinator or the assistant site coordinator) made the initial judgments of whether or not to use TALINET to satisfy a patron's request for information. Original intentions of the TALINET project designers were that the TALINET system would be used only if the requested information could not be obtained from normal sources because of limitations of other resources, time or cost.

After a determination to use TALINET was made, a special request form was completed, including such information as classification of the request as one of three types: interlibrary loan of specific documents; literature searches; or straight-forward reference questions.

The requests were then transmitted to the library of the National Oceanic and Atmospheric Administration, where two TALINET staff members (GRAs) commuted Monday through Friday to process the requests. The work hours of the GRAs corresponded to one full-time staff member present each day. Each information request arriving at the NOAA library during the Trial Operations period was weighed as to urgency, those with most urgent deadlines processed first.

The GRAs completed searches at Denver Metro area libraries and other resources and by telephone calls to individuals, agencies and private firms throughout the country. Literature searches were carried out almost exclusively online with computer and communication hardware at NOAA.

Once the information was obtained by TALINET staff, it was transmitted to the requesting library via one of the telefacsimile systems described. Except for periods when specific equipment use was required for experimental purposes, the selection of the telefacsimile equipment and transmittal mode was left up to the NOAA technician, who was also the person receiving the incoming request.

Upon receiving the requested information, the demonstration library contacted the requesting patron who subsequently picked up the material.

The Trial Operations Period ran from September 11 to December 20, 1978. During this period there were 674 transactions by 293 patrons. During the Trial Operations Period, and again at the close, an internal evaluation was made of the TALINET operating procedures, resulting in several significant changes that were implemented:

- Limitation of interlibrary loan requests to materials at NOAA, the University of Colorado, the Denver Public Library and the University of Denver Library.
- Formal priority ranking of requests.
- More detailed information on the user and his needs.

The Demonstration Period, operating under these revised guidelines, ran from January 4 through March 31, 1979.

Follow-up interviews with 50 users were conduced after both the Trial and Demonstration periods. To partially measure the ultimate value and time value of the requested information, at least one regular user in a decision-making role was identified at each site. This resulted in seven additional interviews.

THE RESULTS

Some of the findings of this project can be summarized as follows:

- Two hundred and sixty eight requests (28 percent) were time critical to the point that they would have been less useful to the user if telefacsimile had not been used.
- During the TALINET project 20.5 percent of the users of the system were new users of the local library.
- Seventy percent of the users became aware of the program through TALINET marketing efforts.
- Telefacsimile, as evaluated by library staffs and users, is an effective means of delivering hard (paper) copy of informational requests.
- Seventy-eight percent of end-users found the telefacsimile copy acceptable and showed no preference for copy from Rapifax or Qwip, though site staffs preferred the Rapifax due to consistently readable copy.
- Fifty eight percent of those asking reference questions, 78.5 percent of those requesting literature searches and 72 percent of those receiving interlibrary loans stated a willingness to pay all or part of the costs of the information received.
- The seven decision makers polled unanimously were willing to pay all costs involved for services received.
- Multi-state library networks can reduce the information-isolation felt by librarians and citizens in small communities in rural areas.

Additionally, some of TALINET's accomplishments include:

- The establishment of current (1978) "benchmark" figures for gauging the criticalness of the time factor to users of small public libraries.
- The establishment of current (1978) unit costs of application of Qwip 1200 and Rapifax 100 to libaries
- The derivation of current (1978) levels of reliability, capability and acceptability of facsimile technology as applied in the library environment.

TABLE 1—Unit costs for Telefax Document Delivery

MONTHLY COST FORMULAE

Qwip 4-minute Mode	Qwip 6-minute Mode	Rapifax (High Speed)	Rapifax (Standard Speed)	Rapifax (Fine Detail)
$240+$16.06x	$240+$22.14x	$1680+$2.13x	$1680+$3.40x	$1680+$4.25x

(Fixed costs include five sites plus resource mode at $40 for Qwip and $280 for Rapifax. Unit costs for a 6-page transaction are determined on the basis of the highest line charges between any two sites in a 6-site system. x = number of transactions.)

AVERAGE MONTHLY COSTS
(Actual TALINET Average)

At 137 transactions per month:	Site Average Costs	(Unit Costs per 6 page Transaction)
Qwip 4-minute mode	$\frac{\$2361+\$240}{5}$ = $520/month	$\frac{\$2601}{147}$ = $17.69
Qwip 6-minute mode	$\frac{\$3255+\$240}{5}$ = $699/month	$\frac{\$3495}{147}$ = $23.78
Rapifax (High Speed)	$\frac{\$1680+\$313}{5}$ = $399/month	$\frac{\$1993}{147}$ = $13.56
Rapifax (Standard Speed)	$\frac{\$1680+\$500}{5}$ = $436/month	$\frac{\$2180}{147}$ = $14.83
Rapifax (Fine Detail)	$\frac{\$1680+\$625}{5}$ = $461/month	$\frac{\$2305}{147}$ = $15.68

All costs were computed using the actual equipment lease charges, long distance telephone charges (request and delivery of material), staff time (computed at $5.00 per hour) and all copying and incidental charges. This composite figure was divided by the average number of monthly transactions (147) to arrive at the 6 page unit transaction costs. Using the same base costs and increasing the volume to the maximum could reduce the per page cost to as low as 31 cents per page or $1.86 for the average Talinet transaction.

Specifically, among the benefits of TALINET were:

- The provision of information to the City Manager of Dodge City, Kansas regarding a proposed methane gas process. He stated that the information helped the City Council make a decision which likely saved the city 5-6 million dollars.
- The provision of medical information with a two-hour turnaround which prevented an unnecessary amputation. (This was the "purple toes" incident in which a surgical team diagnosed gangrene in a patient's foot and were in the process of agreeing to amputate the toes. One dissenting doctor, however, obtained information through TALINET proving the condition was due instead to a reaction to diabetic medication, thus saving the patient's toes from amputation.)

From the viewpoint of cost effectiveness, telefacsimile as demonstrated in TALINET is close to being the *least* costly information delivery method. Breakthroughs in technology, reduction of telephone charges, use of satellites or other factors could make telefacsimile the primary method of information flow to and from libraries.

The tables provide an indication of the costs involved with telefacsimile systems. As can be seen from table 2, telefacsimile (Rapifax 100) costs become cost effective for time critical material as compared to overnight express mail when certain minimum volumes of transactions are reached. Below these "breakeven" volumes, express mail is less expensive (though normally slower) than telefacsimile, above the breakeven volumes, the telefacsimile system is more economical.

It should be pointed out, of course, that costs for individual transactions will vary according to number of pages, telephone rates, total monthly volume and a number of other factors.

TABLE 2

Monthly breakeven volume and appropriate unit costs per 6-page transaction — Rapifax 100 vs Express Mail

	Rapifax Hi Speed	Rapifax Standard	Rapifax Fine Detail
Express Mail	207 trans @ $7.55	270 trans @ $7.55	340 trans @ $7.55

(Please Note: Volumes determined on basis of 4-node system. Dodge City and Durango omitted due to lack of Express Mail Service. $7.55 represents highest Express Mail rate to remaining sites.)

TABLE 3— Summary of the informational sources contacted in the 958 reference searches completed by TALINET.

Sources for TALINET Information Services		No. of End Products Provided
Computerized Data Bases		280
Colorado University Libraries		219
Denver Public Library		118
University of Denver, Penrose Library		31
CU Medical—Dennison Library		19
Colorado State University—Fort Collins		14
OCLC		14
FLNPP		50
Argonne National Laboratories; Chicago, Illinois	1	
Brookhaven National Laboratories; Upton, New York	1	
FLNPP (specific source unknown)	1	
Lawrence Berkeley Laboratory; Berkeley, CA	1	
Los Alamos Scientific Laboratory; Los Alamos, NM	1	
NOAA/Boulder, CO	39	
NOAA/Rockville, MD	1	
Portland, Maine, Public Library	1	
University of Maine	1	
U.S. Dept. of Commerce Library, Washington, D.C.	3	
Other Federal Agencies		15
Bureau of Mines	1	
Clinch River Breeder Reactor; Oak Ridge, TN	1	
Environmental Protection Agency, Denver, CO	1	
Federal Communications Commission, Washington, D.C.	1	
Food and Drug Administration; Boulder, CO	1	
Hanford Atomic Works; Richland, WA	1	
Hawaii Volcano National Park (Park Naturalist)	1	
National Weather Service	1	
Naval History Center; Washington, D.C.	1	
Office of Ambassador Mansfield	1	
U.S. Department of Agriculture; Boulder, CO	2	
U.S. Fish and Wildlife Service, Denver, CO	1	
U.S. Geological Survey	2	
Other State and Local Agencies		5
Boulder Valley School District; Boulder, CO	1	
Cheyenne and Casper, Wyoming, Employment Offices	1	
Denver Public School System	1	
South Dakota Dept. of Education	1	
Wyoming State Legislature	1	

continued overleaf...

TABLE 3 (continued...)

		No. of End Products Provided
Other Universities		21
Colorado School of Mines; Golden, CO	2	
Iliff School of Theology; Denver, CO	3	
Montana School of Mines; Butte, MT	1	
Rice University	1	
St. Thomas Seminary; Denver, CO	1	
University of Arizona	2	
University of Colorado, Faculty	1	
University of Northern Colorado; Greeley, CO	3	
University of Denver, Faculty	2	
University of Denver, Graduate School of Librarianship	1	
University of Denver, Law Library	2	
University of Montana	1	
University of Washington	1	
Other Libraries		9
Adolph Coors Library; Golden, CO	1	
Billings Public Library	1	
Boulder Public Library	1	
Denver Post	1	
Durango Public Library	1	
Linda Hall Library; Kansas City, MO	2	
National Center for Atmospheric Research; Boulder, CO	2	
Miscellaneous Sources		24
Action for Eastern Montana	1	
American Dental Association	1	
American Hospital Association	1	
American Institute of Accountants	1	
Denver General Hospital	1	
Denver Research Institute	1	
Denver Zoo	1	
Institute of Human Resources; Albuquerque, NM	1	
International Business Machines; Wichita, KS	1	
Jones & Jones Law Firm; Powell, WY	1	
Marketing Research Office; Canadian Government, Ottawa	1	
Miller Brewing Company; Milwaukee, WI	1	
The Milwaukee Road; Chicago, IL	1	
National Crime Institute; Washington, D.C.	1	
National Minerals Association; Washington, D.C.	1	
National Speleology Association	1	
PUSH; Chicago, IL	1	
Rapid City, S.D. phone book	1	
Restaurant owner; Denver, CO	1	
Solar Energy Information Center, Rockville, MD	1	
Solar Energy Research Institute, Golden, CO	1	
Squibb, Inc.	1	
Taco Hut, Inc., Tulsa, OK	1	
World Health Organization	1	

Total Unique Sources = 77 + computerized data bases
116 transactions never answered 819 transactions sources
23 sources not identifiable.

Figues 1 and 2 below indicate the total transactions by patron group during both periods of the project for all sites.

Figure 1
Total Transactions by Patron Group — All Sites
Trial Operations Period

Total Transactions = 674

Figure 2
Total Transactions by Patron Group — All Sites
Demonstration Phase

Total Transactions = 284

TABLE 4— Breakdown of the total transactions by type for all sites.

	Trial Operations		Demonstration		Total	
Interlibrary Loan	333	49%	170	60%	503	52%
Literature Searches	159	24	48	17	207	22
Reference Questions	182	27	66	23	248	26
TOTAL	674		284		958	

THE BOTTOM LINE

As used in the TALINET project, telefacsimile can be a cost competitive, accurate and rapid means of obtaining needed information in libraries of limited resources. Equipment available today is adequate for most library applications and can be economically feasible, provided sufficient user demand.

During the Trial Period from September 11 through December 20, 1978 and the Demonstration Period from January 4 through March 31, 1979, the TALINET staff fielded, researched and answered 958 reference questions from the five sites. Most of those questions were those that could not have been answered through local references.

The local staff at the site libraries mastered the use of facsimile equipment with a minimum of effort, and showed a marked preference for the more sophisticated Rapifax 100 equipment due to ease of operation and readability of copy. The slow scan television equipment proved inadequate for the TALINET library use due to the need to coordinate patron and the staff at both requesting and responding libraries. This often required two sessions with the equipment, rather than the one normally required with the other systems. A second problem arose with the inability of the television equipment to transmit an adequately resolved image of an entire page of copy at one viewing.

Though the TALINET project successfully proved the utility and accessibility of telefacsimile as a library research tool, several questions arose which require further study. Some of these are:

- Which information requests are truly time critical and how can this be measured?
- How does information flow in a community?
- What are the most effective techniques for marketing library services?
- What are the long-term effects of quick information access on both library and community?
- What effect will telefacsimile availability have on decision-making in communities remote from information sources?

SINGLE COPIES OF THE FINAL REPORT OF THE TALINET DEMONSTRATION ARE AVAILABLE WITHOUT CHARGE BY WRITING TO:

The Graduate School of Librarianship and Information Science
University of Denver
University Park
Denver, Colorado 80208

TELEFAX LIBRARY INFORMATION NETWORK
AND
THE FEDERAL LIBRARY NETWORK PROTOTYPE PROJECT